# ADA Homework Assignment #1

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## Challenge 1

The R code below will create a vector called **quote** that contains the last line of Charles Darwin's *On the Origin of Species*

```
quote <- ("There is grandeur in this view of life, with its several powers, having been originally brea
quote
```

```
## [1] "There is grandeur in this view of life, with its several powers, having been originally breathe
```

The following will split the string of characters in the vector called **quote** into individual words while also removing any punctuation contained in the vector. Loading the {stringr} package is necessary here.

```
library(stringr)
split_quote <- str_split((gsub("[[:punct:]]","",quote)), " ")
split_quote
```

```
## [[1]]
##  [1] "There"      "is"         "grandeur"   "in"         "this"
##  [6] "view"       "of"         "life"       "with"       "its"
## [11] "several"    "powers"     "having"     "been"       "originally"
## [16] "breathed"   "by"         "the"        "Creator"    "into"
## [21] "a"          "few"        "forms"      "or"         "into"
## [26] "one"        "and"        "that"       "whilst"     "this"
## [31] "planet"     "has"        "gone"       "circling"   "on"
## [36] "according"  "to"         "the"        "fixed"      "law"
## [41] "of"         "gravity"    "from"       "so"         "simple"
## [46] "a"          "beginning"  "endless"    "forms"      "most"
## [51] "beautiful"  "and"        "most"       "wonderful"  "have"
## [56] "been"       "and"        "are"        "being"      "evolved"
```

The following R code creates a new vector of every fourth entry from the vector contained in the list of the quote split into individual words

```
every_fourth<-split_quote[[1]][1:15*4]
every_fourth
```

```
##  [1] "in"        "life"      "powers"    "breathed"  "into"      "or"
##  [7] "that"      "has"       "according" "law"       "so"        "endless"
## [13] "and"       "been"      "evolved"
```

The below code will sort the entries in the defined list in reverse alphabetical order

```
sort(every_fourth, decreasing=TRUE)
```

```
##  [1] "that"      "so"        "powers"    "or"        "life"      "law"
##  [7] "into"      "in"        "has"       "evolved"   "endless"   "breathed"
## [13] "been"      "and"       "according"
```

## Challenge 2

Creation of an 8 x 10 matrix called **m1** consisting of odd integers from 1 to 159 filled column-wise

```
m1 <- matrix(data=seq(from=1,to=159,by=2), nrow=8, ncol=10)
m1
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## [1,]    1   17   33   49   65   81   97  113  129   145
## [2,]    3   19   35   51   67   83   99  115  131   147
## [3,]    5   21   37   53   69   85  101  117  133   149
## [4,]    7   23   39   55   71   87  103  119  135   151
## [5,]    9   25   41   57   73   89  105  121  137   153
## [6,]   11   27   43   59   75   91  107  123  139   155
## [7,]   13   29   45   61   77   93  109  125  141   157
## [8,]   15   31   47   63   79   95  111  127  143   159
```

Extraction of the element in row 5, column 2 using single-bracket notation

```
m1[5,2]
```

```
## [1] 25
```

Extraction of rows 5 to 7 in the matrix **m1**

```
m1[5:7,]
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## [1,]    9   25   41   57   73   89  105  121  137   153
## [2,]   11   27   43   59   75   91  107  123  139   155
## [3,]   13   29   45   61   77   93  109  125  141   157
```

Creation of a new variable **m2** that contains (row 3, column 4) to (row 6, column 9) of **m1** as well as the code to describe the class and mode of **m2**

```
m1$m2 <- m1[3:6, 4:9]
```

```
## Warning in m1$m2 <- m1[3:6, 4:9]: Coercing LHS to a list
```

```
m1$m2
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6]
## [1,]   53   69   85  101  117  133
## [2,]   55   71   87  103  119  135
## [3,]   57   73   89  105  121  137
## [4,]   59   75   91  107  123  139
```

```
class(m1$m2)
```

```
## [1] "matrix"
```

```
mode(m1$m2)
```

```
## [1] "numeric"
```

## Challenge 3

Constructs a 4-dimensional, 400-element array (5 x 5 x 4 x 4), **a**, consisting of the numbers 400 to 1

```
a <- array(data=400:1, dim= c(5,5,4,4))
a
```

```
## , , 1, 1
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  400  395  390  385  380
## [2,]  399  394  389  384  379
## [3,]  398  393  388  383  378
## [4,]  397  392  387  382  377
## [5,]  396  391  386  381  376
##
## , , 2, 1
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  375  370  365  360  355
## [2,]  374  369  364  359  354
## [3,]  373  368  363  358  353
## [4,]  372  367  362  357  352
## [5,]  371  366  361  356  351
##
## , , 3, 1
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  350  345  340  335  330
## [2,]  349  344  339  334  329
## [3,]  348  343  338  333  328
## [4,]  347  342  337  332  327
## [5,]  346  341  336  331  326
##
```

```
## , , 4, 1
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  325  320  315  310  305
## [2,]  324  319  314  309  304
## [3,]  323  318  313  308  303
## [4,]  322  317  312  307  302
## [5,]  321  316  311  306  301
##
## , , 1, 2
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  300  295  290  285  280
## [2,]  299  294  289  284  279
## [3,]  298  293  288  283  278
## [4,]  297  292  287  282  277
## [5,]  296  291  286  281  276
##
## , , 2, 2
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  275  270  265  260  255
## [2,]  274  269  264  259  254
## [3,]  273  268  263  258  253
## [4,]  272  267  262  257  252
## [5,]  271  266  261  256  251
##
## , , 3, 2
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  250  245  240  235  230
## [2,]  249  244  239  234  229
## [3,]  248  243  238  233  228
## [4,]  247  242  237  232  227
## [5,]  246  241  236  231  226
##
## , , 4, 2
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  225  220  215  210  205
## [2,]  224  219  214  209  204
## [3,]  223  218  213  208  203
## [4,]  222  217  212  207  202
## [5,]  221  216  211  206  201
##
## , , 1, 3
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  200  195  190  185  180
## [2,]  199  194  189  184  179
## [3,]  198  193  188  183  178
## [4,]  197  192  187  182  177
## [5,]  196  191  186  181  176
##
```

```
## , , 2, 3
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  175  170  165  160  155
## [2,]  174  169  164  159  154
## [3,]  173  168  163  158  153
## [4,]  172  167  162  157  152
## [5,]  171  166  161  156  151
##
## , , 3, 3
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  150  145  140  135  130
## [2,]  149  144  139  134  129
## [3,]  148  143  138  133  128
## [4,]  147  142  137  132  127
## [5,]  146  141  136  131  126
##
## , , 4, 3
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  125  120  115  110  105
## [2,]  124  119  114  109  104
## [3,]  123  118  113  108  103
## [4,]  122  117  112  107  102
## [5,]  121  116  111  106  101
##
## , , 1, 4
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  100   95   90   85   80
## [2,]   99   94   89   84   79
## [3,]   98   93   88   83   78
## [4,]   97   92   87   82   77
## [5,]   96   91   86   81   76
##
## , , 2, 4
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   75   70   65   60   55
## [2,]   74   69   64   59   54
## [3,]   73   68   63   58   53
## [4,]   72   67   62   57   52
## [5,]   71   66   61   56   51
##
## , , 3, 4
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   50   45   40   35   30
## [2,]   49   44   39   34   29
## [3,]   48   43   38   33   28
## [4,]   47   42   37   32   27
## [5,]   46   41   36   31   26
##
```

```
## , , 4, 4
##
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   25   20   15   10    5
## [2,]   24   19   14    9    4
## [3,]   23   18   13    8    3
## [4,]   22   17   12    7    2
## [5,]   21   16   11    6    1
```

Extractions of varying elements of parts of **a**

```
a[1,1,1,2]
```

```
## [1] 300
```

```
a[2,3,2,]
```

```
## [1] 364 264 164  64
```

```
a[1:5,1:5,3,3]
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  150  145  140  135  130
## [2,]  149  144  139  134  129
## [3,]  148  143  138  133  128
## [4,]  147  142  137  132  127
## [5,]  146  141  136  131  126
```

## Challenge 4

The following creates a list of the (simplified) primate taxonomy including the taxonomic levels and names of each internal node.

```
Lorisoidea <- list("Lorisidae", "Galagidae")
Lorisiformes <- list(Lorisoidea)
names(Lorisiformes)<- c("Superfamily_Lorisoidea")
Lemuroidea <- list("Cheirogaleidae", "Lepilemuridae", "Indriidae", "Lemuridae", "Daubentoniidae")
Lemuriformes <- list(Lemuroidea)
names(Lemuriformes)<- c("Superfamily_Lemuroidea")
Strepsirhini <- list(Lemuriformes, Lorisiformes)
names(Strepsirhini) <- c("Infraorder_Lemuriformes","Infraorder_Lorisiformes")
Cercopithecoidea <- list("Cercopithecidae")
Hominoidea <- list("Hylobatidae", "Hominidae")
Catarrhini <- list(Hominoidea, Cercopithecoidea)
names(Catarrhini)<- c("Superfamily_Hominoidea","Superfamily_Cercopithecoidea")
Ceboidea <- list("Cebidae", "Atelidae", "Pitheciidae")
Platyrrhini <- list(Ceboidea)
names(Platyrrhini)<-c("Superfamily_Ceboidea")
Simiiformes <- list(Platyrrhini, Catarrhini)
names(Simiiformes)<-c("Parvorder_Platyrrhini","Parvorder_Catarrhini")
Tarsioidea <- list("Tarsiidae")
```

```
Tarsiiformes <- list(Tarsioidea)
names(Tarsiiformes)<-c("Superfamily_Tarsiodea")
Haplorhini <- list(Tarsiiformes, Simiiformes)
names(Haplorhini)<-c("Infraorder_Tarsiiformes","Infraorder_Simiiformes")
Primates <- list(Strepsirhini, Haplorhini)
names(Primates)<-c("Suborder_Strepsirhini","Suborder_Haplorhini")
```

The following uses double bracket notation to extract the New World Monkeys (Parvorder: Platyrrhini) from the list as a new variable **nwm** and lists the class and mode of the variable.

```
Primates$nwm <- Primates[[2]][[2]][1]
Primates$nwm
```

```
## $Parvorder_Platyrrhini
## $Parvorder_Platyrrhini$Superfamily_Ceboidea
## $Parvorder_Platyrrhini$Superfamily_Ceboidea[[1]]
## [1] "Cebidae"
##
## $Parvorder_Platyrrhini$Superfamily_Ceboidea[[2]]
## [1] "Atelidae"
##
## $Parvorder_Platyrrhini$Superfamily_Ceboidea[[3]]
## [1] "Pitheciidae"
```

```
class(Primates$nwm)
```

```
## [1] "list"
```

```
mode(Primates$nwm)
```

```
## [1] "list"
```

The following uses $ notation to extract the tarsiers from the list

```
Primates$Suborder_Haplorhini$Infraorder_Tarsiiformes
```

```
## $Superfamily_Tarsiodea
## $Superfamily_Tarsiodea[[1]]
## [1] "Tarsiidae"
```